

don, and Rockwood; 3.8 feet at Charleston, and 4.9 feet at Chattanooga. When a 5-foot stage is at Chattanooga, with the ground moist, and a general and heavy rainfall occurs over the system, the first inch of rain will cause a rise of about 7 feet at Chattanooga, the next 2 inches about 5 feet, and as the river reaches the 25-foot mark the rise is about 3.7 feet to an inch; after it passes the 33-foot mark, or danger line, the rise is less per inch of rainfall, owing to the lowlands that are then flooded. At the 40-foot stage the rise is 2.5 feet for every inch of rain; this is when the rainfall is general and steady; but when the rainfall is exceedingly heavy, and the river is at a 20-foot stage at Chattanooga, the average rise is about 4 feet to every inch of rainfall. This is the average based upon the records from 1879 to 1895, but it has been frequently noticed during the past two years that a general rain of from 1 to 1½ inches over the system causes only a slight rise in the Tennessee River and tributaries, especially during the summer and fall months. The only solution that can be given for the failure of the rivers to rise to their estimated height is because the ground absorbs a very large portion of the water and very little finds its way into the river channel. It is also noticed that the river in the past few years falls faster than in former years, and when it begins to fall, half an inch of rainfall has little weight in checking its falling tendency. It is evident that the destruction of the forests over the headwaters affects the rises in the river by exposing more absorbing surface, while previous to the removal of the timber the ground was always moist or wet, absorbed very little of the rainfall, and nearly all the water found its way into the river, or, in other words, the blanket has been removed. It will be found to be the fact that heavy rainfall over the south side of the Tennessee River will cause only a slight rise at Chattanooga, but a heavy rainfall over the northern side or entire river system will give a greater and more rapid rise. A rise at Clinton (distant by river 141 miles) takes about sixty hours to reach Chattanooga; Kingston (95 miles) and Rockwood (83 miles), thirty-six hours; Knoxville (154 miles), fifty hours; Loudon (109 miles), forty hours; Charleston (53 miles), twenty-four hours.

In most of the rivers of the world, the occurrence of a special high water at any particular station is usually found to result from the fact that certain floods starting at different times in the different tributaries and flowing down stream at different rates of speed have arrived at the station almost simultaneously. We can but think that the destruction of forests is a minor matter, and that a concurrence of floods from the upper watersheds of the tributaries of the Tennessee is essential to the production of the highest floods at Chattanooga, such as that of March 1, 1867 (58.05 feet), March 1, 1875 (53.98 feet), March 11, 1884 (42.8 feet), and April 3, 1886 (52.2 feet). On page 14 Mr. Pindell notes:

That each successive high water since 1867 has been less than the previous one, and that this is evidently due to the extensive improvements made on the river by the United States Engineer Corps. The discharge of the river at both rising and falling stages was measured in 1893 by the officials of the Weather Bureau. When the river reaches the 3-foot stage that is considered the opening of navigation when the river is rising and the closing of navigation when it is falling. The total number of days when the river was at or above the 3-foot stage has, during the past seventeen years, varied between two hundred and ten and three hundred and thirty-five days as the extreme limits. Occasionally the river is frozen over at Chattanooga, as for instance January 12-14, 1886; January 14-22, 1893, and February 14, 1895. The zeros of the river gauges at the river gauge station above mentioned have the following elevations above mean sea level: Strawberry Plains, 859.79 feet; Knoxville, 806.60; Loudon, 737.10; Rockwood, 699.70; Chattanooga, 630.64; Clinton, 732.30; Kingston, 712.80; Charleston, 684.00.

On page 29 Mr. Pindell reprints a table and note, first published in the Annual Report of the Chief Signal Officer, 1891, in which is given the water stages at Clinton and the corresponding maximum water stages at Chattanooga two days later. For instance, a 5-foot stage at Clinton is followed by a 6.2 stage at Chattanooga, but a 45-foot stage at Clinton by a 52.2 stage at Chattanooga, and proportionately at intermediate stages, but these figures are liable to considerable irregularities because of the unevenness of the rainfall over the valleys of this high region and the fact that so many tributaries must conspire to produce considerable high water at Chattanooga.

## MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has translated the following tables from the current numbers of the Boletín Mensual as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied. One additional station, Topolobampo, is published at the end of Table II.

Mexican data for September, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	Inch.	° F.	%	Inch.		
Colima (Seminario) .....	1,663.4*	28.25	78.1	79	5.11	sw.	.....
Colima .....	.....	.....	79.3	.....	.....	.....	.....
Guadalajara (Obs. d. Est.) .....	5,140.8	24.97	63.8	89	7.95	ne.	e.
Guajuato .....	6,761.3	23.68	66.6	60	8.20	ws.	w.
Jalapa .....	4,757.3	25.55	68.4	86	7.57	n.	.....
Lagos (Liceo Guerra) .....	6,274.7	24.15	67.6	65	2.79	ne.	e.
Leon .....	5,901.0	24.39	68.2	65	4.46	s.	e.
Magdalena (Sonora) .....	.....	.....	81.1	.....	15.94	.....	.....
Mazatlan .....	24.6	29.84	83.8	78	5.00	w.	e.
Merida .....	50.2	29.86	81.3	80	3.34	ne.	w.
Mexico (Obs. Cent.) .....	7,488.7	23.07	62.4	69	3.32	n.	ne.
Morelia (Seminario) .....	6,401.0	23.96	62.4	76	3.74	s.	ene.
Oaxaca .....	5,164.4	25.06	71.6	73	4.42	nw.	ne.
Pachuca .....	7,956.3	23.55	57.4	71	3.53	ne.	ne.
Puebla (Col. Cat.) .....	7,112.0	23.37	65.1	68	4.26	.....	.....
Queretaro .....	6,069.7	24.17	67.6	66	2.93	e.	.....
San Luis Potosí .....	6,201.9	24.14	69.6	66	1.63	e.	e.
Silao .....	6,063.1	24.26	70.2	73	1.77	ne.	ne.
Tacubaya (Obs. Nac.) .....	7,620.2	.....	.....	.....	.....	.....	.....
Toluca .....	8,612.4	21.91	57.6	72	3.59	w.	.....
Trejo (Hac. Silao, Gto.) .....	6,010.6	.....	.....	.....	7.23	.....	.....
Zacatecas .....	8,015.2	22.55	63.3	63	5.17	e.	e.

\*These altitudes have been variously published in the original "Boletín," and a clerical error has also slipped into the MONTHLY WEATHER REVIEW. A further explanation will be given as soon as possible.

Mexican data for October, 1896.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inch.	° F.	° F.	° F.	%	Inch.		
Campeche .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colima (Seminario) .....	1,663	28.25	88.2	65.1	76.5	80	8.14	ws.	.....
Colima .....	.....	.....	.....	.....	77.7	.....	.....	.....	.....
Guadalajara (O. d. E.) .....	5,141	24.98	80.6	59.0	68.0	82	4.01	sse.	e.
Guajuato .....	6,761	23.68	81.0	54.9	64.9	65	4.13	sw.	e.
Jalapa .....	4,757	25.55	84.4	54.5	66.9	88	7.47	e.	.....
Lagos .....	6,275	24.14	81.9	49.8	64.6	71	3.46	sw.	sw.
Leon .....	5,901	24.30	81.9	52.0	66.0	68	1.22	s.	sw.
Magdalena (Sonora) .....	.....	.....	88.0	59.9	76.8	.....	4.61	ne.	n.
Mazatlan .....	25	29.87	89.4	66.2	80.8	80	4.79	nw.	sw.
Merida .....	50	29.89	96.8	66.7	80.6	76	0.38	ne.	e.
Mexico (Obs. Cent.) .....	7,489	23.07	75.4	49.1	61.3	71	4.13	nw.	ne.
Morelia (Seminario) .....	6,401	23.96	75.4	50.0	61.3	76	3.90	s.	s.
Oaxaca .....	5,164	25.06	86.5	52.5	70.7	66	3.72	nw.	ne.
Pabellón .....	6,312	.....	.....	.....	.....	.....	.....	.....	.....
Pachuca .....	7,956	23.57	76.3	45.1	58.8	73	1.06	ne.	ne.
Puebla (Col. d. Est.) .....	7,112	23.37	.....	.....	64.8	68	3.11	.....	.....
Puebla (Col. Cat.) .....	7,112	23.37	.....	.....	64.8	68	3.11	.....	.....
Queretaro .....	6,070	.....	.....	.....	.....	.....	.....	.....	.....
Saltillo (Col. S. Juan) .....	5,377	24.88	77.5	53.2	63.0	70	8.50	s.	n.
San Luis Potosí .....	6,202	24.13	77.2	54.0	64.6	72	3.13	e.	w.
Silao .....	6,063	24.26	77.5	58.5	68.4	76	2.80	w.	w.
Tacámbaro .....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacubaya (Obs. Nac.) .....	7,620	.....	.....	.....	.....	.....	.....	.....	.....
Tampico (Obs. Mil.) .....	38	29.92	88.5	66.2	77.5	77	3.27	se. & ne.	se. & ne.
Tehuacan .....	5,453	.....	.....	.....	.....	.....	.....	.....	.....
Toluca .....	8,612	21.91	70.9	42.3	56.1	74	3.46	sw.	.....
Trejo (Hac. Sil., Gto.) .....	6,011	.....	.....	.....	.....	.....	3.28	.....	.....
Veracruz .....	48	29.98	91.9	68.9	80.4	76	5.37	ne.	.....
Zacatecas .....	8,015	22.53	77.4	45.9	58.8	73	6.99	sw.	e.
Zapotlán (Seminario) .....	5,125	25.08	82.8	59.0	68.7	.....	5.74	se. & n.	e.